CLAIMS

What is claimed is:

1. A vacuum separation, transport and collection system (10) for immiscible liquids, the system (10) comprising:

a. separator means (12) for separating two or more immiscible liquids;

b. a holder (16) in fluid communication with the separation means (12) for receiving and holding separated immiscible liquid (26) from the separation means (12);

c. a collector (18) in fluid communication through a vacuum line (20) with the holder (16);

d. vacuum generator means (22) in fluid communication with the collector (18) for applying a vacuum to the collector (18) and from the collector (18) through the vacuum line (20) to the holder (16) so that separated immiscible liquid (26) in the holder (16) is drawn into the collector (18) by the vacuum; and,

e. controller means (28) in communication with the vacuum generator means (22) for controlling the vacuum generator means (22) to apply a vacuum to the collector (18) and holder (16) for a predetermined vacuum duty cycle to periodically transport separated immiscible liquid (26) from the holder (16) to the collector (18).

2. The vacuum system (10) of claim 1, wherein the vacuum generator means (22) and vacuum line (20) are cooperatively structured so that a flow rate of immiscible liquid from the holder (16) to the collector (18) is greater than a flow rate of separated immiscible liquid from the separator (12) to the holder (16).

3. The vacuum system (10) of claim 1, wherein the vacuum generator means (22) and the controller means (28) are secured within a common housing (50), and the housing includes an integral sealing cap (38) for sealing the housing (50) to the collector (18), the vacuum line (20) and vacuum directed from the vacuum generator means (22) pass through the sealing cap (38) into the collector (18), and the collector (18) may be removed from the sealing cap (38) to remove collected immiscible liquid (34) from the collector (18).

4. The vacuum system (10) of claim 1, wherein the vacuum generator means (22) and the controller means (28) are secured within a common housing (50), the vacuum generator means (22) includes a compressed air vent (27), and a plurality of cooling holes (92, 94) are defined within the housing (50) so that compressed air passing out of the compressed air vent (27) passes out of the cooling holes (92, 94) to remove heat from within the housing (50).

5. The vacuum system (10) of claim 1, wherein the controller means (80) includes a vacuum timer (104) secured in communication with a control solenoid (86) for controlling flow of a stream of compressed air through a venturi-effect vacuum generator (88), so that the vacuum timer (104) may control application of a vacuum to the collector (18) for the predetermined vacuum duty cycle.

6. The vacuum system (10) of claim 1 wherein the system further comprises a screen (52) positioned between the separator (12) and the holder (16), wherein a shortest internal diameter of the vacuum line (20) extending between the holder (16) and the collector (18) is at least two times greater than a longest distance across any passageways defined within the screen (52).

7. The vacuum system (10) of claim 1, further comprising a separation container (56) secured between the holder (16) and the collector (18) and secured in fluid communication with the holder (16) through a first vacuum line extension (58) and secured in fluid communication with the collector (18) through a second vacuum line extension (60), so that separated immiscible liquid (26) within the holder (16) passes through the separation container (56) before entering the collector (18).

8. The vacuum system (10) of claim 1, further comprising a volume sensor (32) secured within the collector (18) and in communication with the controller means (28) for terminating generation of the vacuum by the vacuum generator means (22) whenever a predetermined volume of immiscible liquid (34) is collected within the collector (18).

9. The vacuum system (10) of claim 1, wherein the vacuum line (20) is dimensioned to have an internal diameter of or less than about one-quarter inch and a length of greater than about eight feet to enhance degassing of the immiscible liquid being transported through the vacuum line (20) from the holder (16) to the collector (18).

10. The vacuum system (10) of claim 1, further comprising a multiple outlet, unrestricting discharge nozzle (44) secured to the vacuum line (20) within the collector (18), the nozzle (44) defining a plurality of outlets through which the immiscible liquid flows into the collector (18) wherein the outlets do not restrict flow of the immiscible liquid through the vacuum line (20) and each outlet defines a narrower outlet than an internal diameter of the vacuum line (20).

11. The vacuum system (10) of claim 1, further comprising a transformer means (46) in electrical communication with the controller means (28) for converting electrical energy into an electrical current having a potential of less than thirty volts.

12. A vacuum separation, transport and collection system (10) for immiscible liquids, the system (10) comprising:

a. separator means (12) for separating two immiscible liquids;

b. a holder (16) in fluid communication with the separation means (12) for receiving and holding separated immiscible liquid (26) from the separation means (12);

c. a collector (18) in fluid communication through a vacuum line (20) with the holder (16);

d. vacuum generator means (22) in fluid communication with the collector (18) for applying a vacuum to the collector (18) and from the collector (18) through the vacuum line (20) to the holder (16) so that separated immiscible liquid (26) in the holder (16) is drawn into the collector (18) by the vacuum; and,

e. controller means (28) in communication with the vacuum generator means (22) and with the separator means (12) for controlling the vacuum generator means (22) to apply a vacuum to the collector (18) and holder (16) for a predetermined vacuum duty cycle to periodically transport separated immiscible liquid from the holder (16) to the collector (18), and for controlling the separator means (12) to separate immiscible liquid and direct it to flow into the holder (16) for a predetermined separator duty cycle.

13. The vacuum system (10) of claim 12, wherein the vacuum generator means (22) and vacuum line (20) are cooperatively structured so that a flow rate of immiscible liquid from the holder (16) to the collector (18) is greater than a flow rate of separated immiscible liquid from the separator (12) to the holder (16).

14. The vacuum system (10) of claim 12 wherein the vacuum generator means (22) and the controller means (28) are secured within a common housing (50), the vacuum generator means (22) includes a compressed air vent (27), and a plurality of cooling holes (92, 94) are defined within the housing (50) so that compressed air passing out of the compressed air vent (27) passes out of the cooling holes (92, 94) to remove heat from within the housing (50).

15. The vacuum system (10) of claim 12, wherein the controller means (80) includes a vacuum timer (104) secured in communication with a control solenoid (86) for controlling flow of a stream of compressed air through a venturi-effect vacuum generator (88), so that the vacuum timer (104) may control application of a vacuum to the collector (18) for the predetermined vacuum duty cycle, and the controller means (80) includes a separator timer (102) secured in communication with the separator means (12) for controlling the separator means (12) to separate the immiscible liquid and direct it to flow into the holder (16) for a predetermined separator duty cycle.

16. The vacuum system (10) of claim 12 wherein the vacuum line (20) is dimensioned to have an internal diameter of about or less than one-quarter inch and a length of about or greater than about eight feet to enhance degassing of the immiscible liquid being

transported through the vacuum line (20) from the holder (16) to the collector (18).

17. A method of separating, transporting and collecting immiscible liquids, comprising the steps of:

a. providing a separator means (12) for separating two immiscible liquids;

b. securing a holder (16) in fluid communication with the separator means (12) for receiving a separated immiscible liquid (26);

c. securing a collector (18) in fluid communication through a vacuum line (20) with the holder (16);

d. controlling the separator means (12) to separate the immiscible liquid and direct it to flow into the holder (16) for a predetermined separator duty cycle; and,

e. controlling a vacuum generator means (22) to apply a vacuum to the collector (18) and through the vacuum line (20) to the holder to direct the immiscible liquid (26) within the holder (16) to flow into the collector (18) for a predetermined vacuum duty cycle.

18. The method of claim 17, comprising the further steps of controlling the vacuum generator means (22) to apply a vacuum only when the separator means (12) is separating the immiscible liquid, and controlling the vacuum generator means (22) to apply a vacuum for a vacuum duty cycle having a duration of time of that is less than a duration of time of the separator duty cycle.

19. The method of claim 18, comprising the further steps of controlling the vacuum generator means (22) to apply a vacuum to the collector for a vacuum duty cycle having a duration of time that is no greater than one half of the

duration of time of the separator duty cycle.

20. The method of claim 19, comprising the further steps of providing the vacuum line (20) between the holder (16) and the collector (18) and controlling the vacuum generator means (22) so that the separated immiscible liquid is transported from the holder (16) to the collector (18) at a flow rate that is at least two times greater than a flow rate of the separated immiscible liquid from the separator (12) into the holder (16).